DoD Artificial Intelligence Strategy Overview

U.S. AIR FORCE

International Test and Evaluation Association
Test Instrumentation Workshop

14-16 May 2019

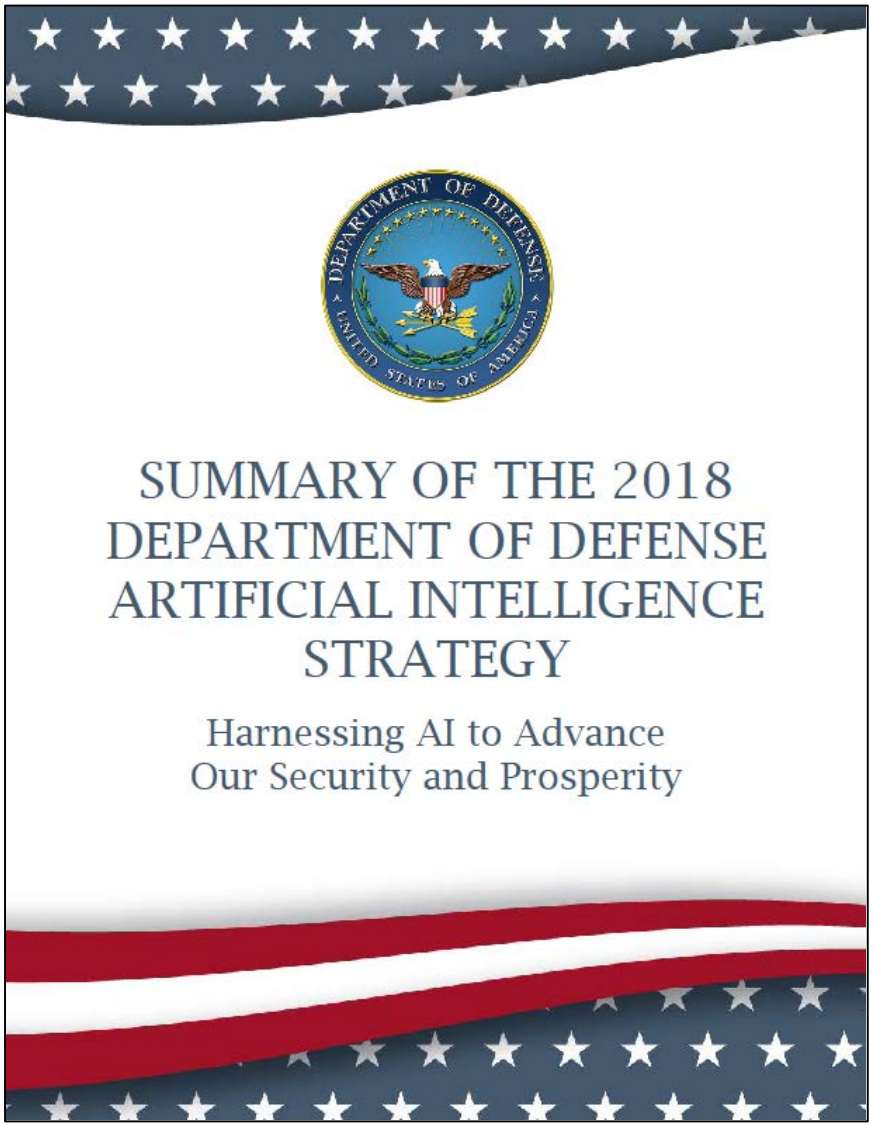
Outline

- Background
- Introduction
- Strategic Approach
- Strategic Focus Areas
- Conclusion
- References

Background

- DoD CIO released DoD Artificial Intelligence (AI) Strategy Summary on 12 Feb 2019
  - Press Release [1]
  - Strategy Document [2]

"AI is rapidly changing a wide range of businesses and industries. It is also poised to change the character of the future battlefield and the pace of threats we must face." [3]



[1] https://dod.defense.gov/News/News-Releases/News-Release-View/Article/1755388/new-strategy-outlines-path-forward-for-artificial-intelligence/

[2] https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF

[3] Ibid, Preface

Introduction

Primary Introduction Points [4]

- Harnessing AI to Advance Our Security and Prosperity
- AI will benefit both the Department and the Nation

[4] https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF, pages 5-6

Introduction

- Harnessing AI to Advance Our Security and Prosperity
  - DEFINITION: The ability of machines to perform tasks that normally require human intelligence, for example:
    - Recognizing patterns
    - Learning from experience
    - Drawing conclusions
    - Making predictions
  - AI is poised to transform every industry and is expected to impact every corner of the DoD
  - Other nations are making significant investments in AI for military purposes
    - Particularly China and Russia
    - Threaten to erode US military advantage and destabilize international order
  - The US must adopt AI to maintain its strategic position and prevail on future battlefields

Introduction

- AI will benefit both the Department and the Nation
  - Support and protect service members and civilians around the world
    - Better maintain equipment, reduce operational costs, and improve readiness
    - Improve the accuracy of military assessments and enhance mission precision
      - Reduce risk of civilian casualties and collateral damage
  - Protect country and safeguard citizens
    - Enhance ability to predict, identify, and respond to cyber and physical threats
    - Discourage attempts to disrupt US infrastructure such as:
      - Financial networks and electric grids
      - Election processes and medical systems
  - Create an efficient and streamlined organization
    - Simplify workflows
    - Improve the speed and accuracy of repetitive tasks
  - Become a pioneer in scaling AI across a global enterprise
    - Identify and implement new organizational approaches
    - Establish key AI building blocks and standards
    - Develop and attract AI talent
    - Introduce new operational models

Strategic Approach

Primary Approach Elements [5]

- DoD is taking immediate action to realize the benefits of AI
  - Delivering AI-enabled capabilities that address key missions
  - Scaling AI's impact across DoD through a common foundation than enables decentralized development and experimentation
  - Cultivating a leading AI workforce
  - Engaging with commercial, academic, and international allies and partners
  - Leading in military ethics and AI safety
- The Joint Artificial Intelligence Center is a focal point of the DoD AI Strategy

[5] https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF, pages 7-10

Strategic Approach

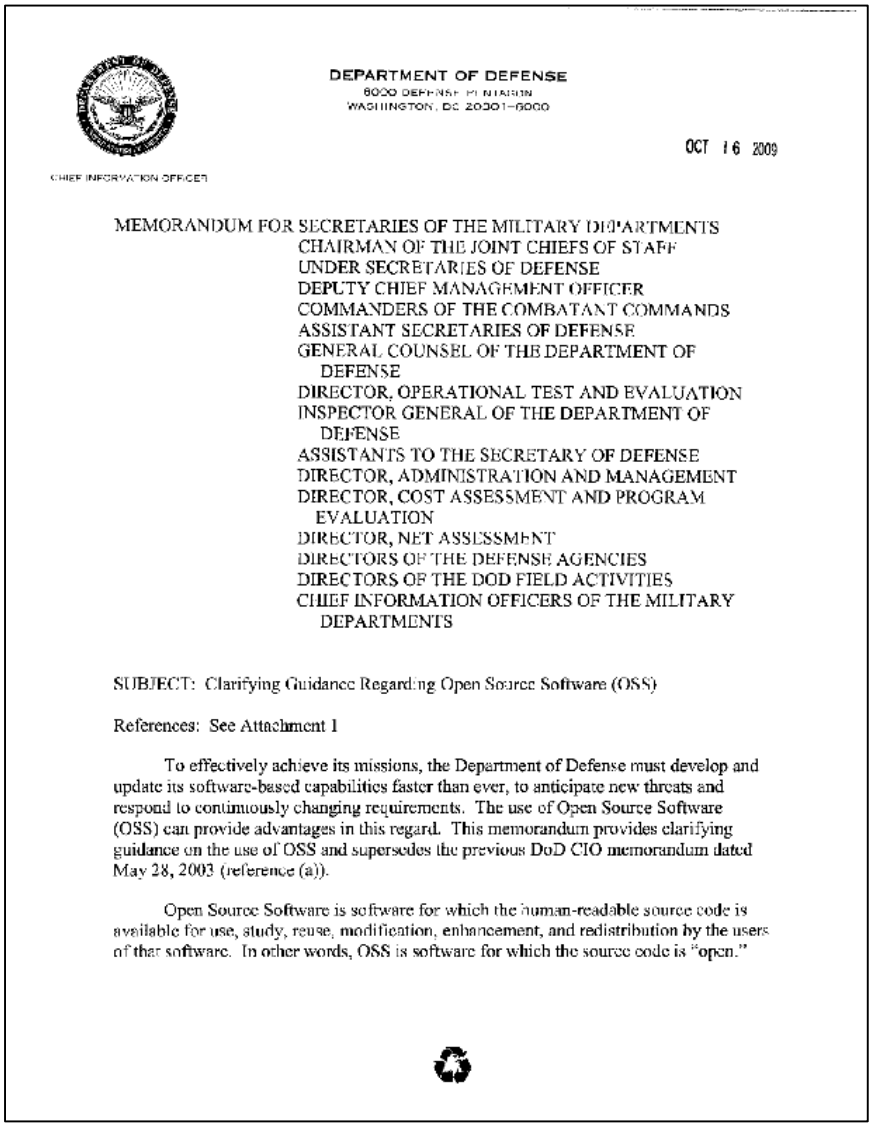
- Delivering AI-enabled capabilities that address key missions
  - Launch initiatives to incorporate AI rapidly and iteratively across key mission areas
    - Improve situational awareness and decision-making
    - Increase safety of operating equipment
    - Implement predictive maintenance and supply
    - Streamline business processes
  - Prioritize the fielding of AI systems that augment personnel
    - Offload tedious cognitive or physical tasks
    - Introduce new ways of working
- Scaling AI's impact across DoD through a common foundation than enables decentralized development and experimentation
  - Put in place key building blocks and platforms to scale and democratize access to AI
    - Shared data and reusable tools
    - Frameworks and standards
    - Cloud and edge services
  - Take steps to AI-enable existing processes
    - Digitization of data
    - Smart automation of processes

Strategic Approach

- Cultivating a leading AI workforce
  - Encourage rapid experimentation and iterative approaches to AI implementation
  - Invest in comprehensive AI training
  - Recruit and partner with world-class AI talent
- Engaging with commercial, academic, and international allies and partners
  - Work with academia and industry to address significant global challenges
  - Make funding available to entice academia to invest in:
    - Long-term research relevant to defense
    - Educating the next generation of AI talent
  - Enhance partnerships with industry to align civilian AI leadership with defense challenges
  - Evolve crucial international alliances and partnerships
  - Engage with, and contribute to, the global open-source community
    - Identify and advance emerging technologies and applications

Strategic Approach

- SIDEBAR: DoD and Open Source
  - DoD Memorandum "Clarifying Guidance Regarding Open Source Software (OSS)" dated 16 Oct 2009 [6]
    - SECURITY: The continuous and broad peer-review of OSS supports software reliability and security
    - AGILITY: The unrestricted ability to modify OSS enables the DoD to respond more rapidly to changing situations
    - COST: The lack of licensing costs with OSS provides a cost advantage where many software copies are required
  - Proprietary per-user or per-core software licensing can become cost prohibitive at the massive scale required to fully leverage AI



DEPARTMENT OF DEFENSE
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WASHINGTON, DC 20301-6000

CHIEF INFORMATION OFFICER

OCT 16 2009

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
CHAIRMAN OF THE JOINT CHIEFS OF STAFF
UNDER SECRETARIES OF DEFENSE
DEPUTY CHIEF MANAGEMENT OFFICER
COMMANDERS OF THE COMBATANT COMMANDS
ASSISTANT SECRETARIES OF DEFENSE
GENERAL COUNSEL OF THE DEPARTMENT OF DEFENSE
DIRECTOR, OPERATIONAL TEST AND EVALUATION
INSPECTOR GENERAL OF THE DEPARTMENT OF DEFENSE
ASSISTANTS TO THE SECRETARY OF DEFENSE
DIRECTOR, ADMINISTRATION AND MANAGEMENT
DIRECTOR, COST ASSESSMENT AND PROGRAM EVALUATION
DIRECTOR, NET ASSESSMENT
DIRECTORS OF THE DEFENSE AGENCIES
DIRECTORS OF THE DOD FIELD ACTIVITIES
CHIEF INFORMATION OFFICERS OF THE MILITARY DEPARTMENTS

SUBJECT: Clarifying Guidance Regarding Open Source Software (OSS)

References: See Attachment 1

To effectively achieve its missions, the Department of Defense must develop and update its software-based capabilities faster than ever, to anticipate new threats and respond to continuously changing requirements. The use of Open Source Software (OSS) can provide advantages in this regard. This memorandum provides clarifying guidance on the use of OSS and supersedes the previous DoD CIO memorandum dated May 28, 2003 (reference (a)).

Open Source Software is software for which the human-readable source code is available for use, study, reuse, modification, enhancement, and redistribution by the users of that software. In other words, OSS is software for which the source code is "open."

[6] https://dodcio.defense.gov/Portals/0/Documents/OSSFAQ/2009OSS.pdf

Strategic Approach

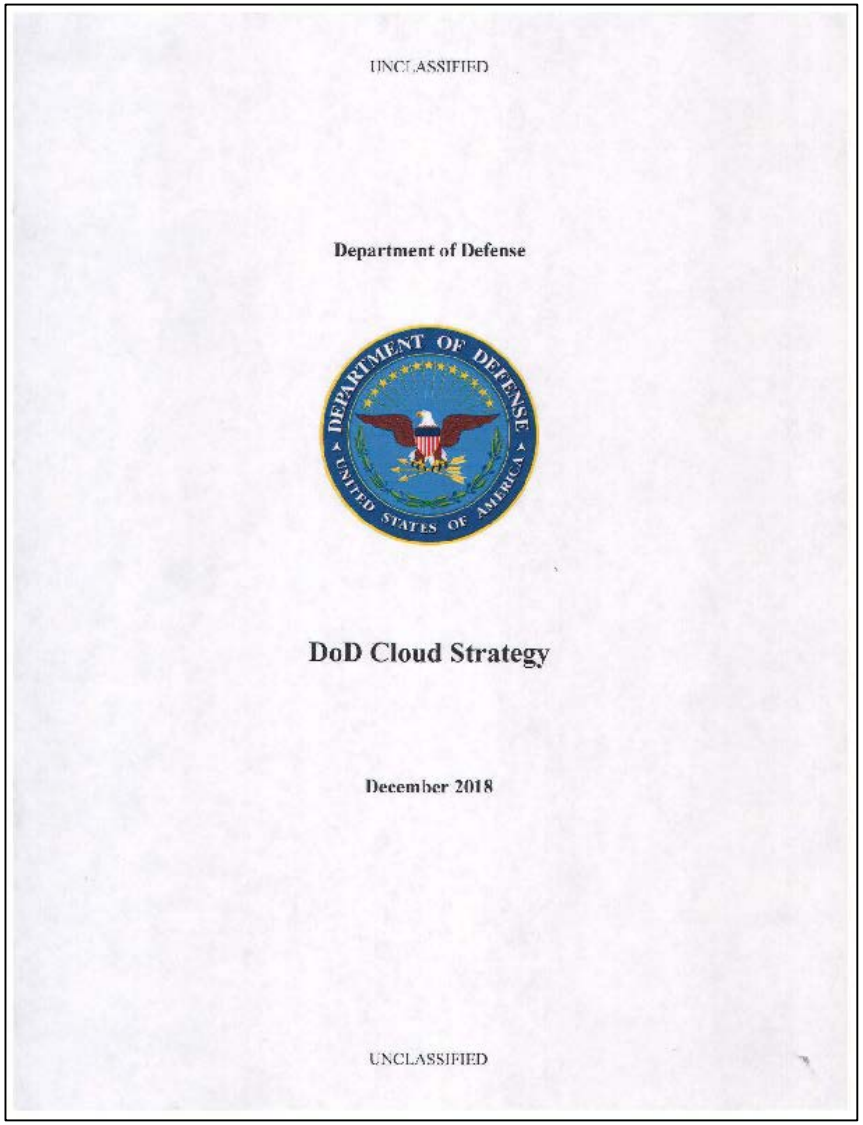
- Leading in military ethics and AI safety
  - Consult with leaders across academia, private industry, and the international community to advance AI ethics and safety
  - Invest in research and development of AI systems that are resilient and robust, reliable and secure
  - Fund research into techniques that produce more explainable AI
  - Pioneer approaches for AI test and evaluation, verification and validation
  - Seek opportunities to use AI to reduce collateral damage through increased situational awareness and enhanced decision support
  - Share ethical guidelines and safety procedures to encourage responsible AI development and deployment by other nations

Strategic Approach

- The Joint Artificial Intelligence Center (JAIC) is a focal point of the DoD AI Strategy
  - Established to accelerate the delivery of AI-enabled capabilities
  - Will operate across the full AI application lifecycle with an emphasis on near-term execution and AI adoption
    - Identify and deliver prototypes
      - National Mission Initiatives (NMIs) for Joint Force AI deployments
      - Component Mission Initiatives (CMIs) for Service-specific AI deployments
    - Share lessons and merge research with operations
    - Scale successful prototypes
    - Provide ongoing support
  - Will complement the efforts of DARPA and DoD Laboratories focused on long-term technology creation and future AI research and development

Strategic Approach

- SIDEBAR: JAIC and JEDI [7]
  - The Joint Artificial Intelligence Center (JAIC) will require an enterprise cloud infrastructure capability
  - An enterprise cloud will provide the common data and infrastructure platforms that will enable AI to maximize warfighter advantage
  - The Joint Enterprise Defense Infrastructure (JEDI) Cloud Program will be the DoD enterprise-wide cloud solution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Department of Defense

DoD Cloud Strategy

December 2018

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[7] https://media.defense.gov/2019/Feb/04/2002085866/-1/-1/1/DOD-CLOUD-STRATEGY.PDF, page 2, A-1 to A-2

Strategic Approach

- SIDEBAR: AI and Enterprise Cloud in the news

"The Pentagon's top tech official told Congress that the push for enterprise cloud isn't for the sake of modernization or convenience – it is to leverage artificial intelligence and big data." [8]

"The Defense Department needs enterprise cloud computing to make the most of its ambitious plans for artificial intelligence, according to Lt. Gen. Jack Shanahan, who leads the department's Joint Artificial Intelligence Center… "You cannot get to true impact at scale with AI without an enterprise cloud solution," Shanahan said Thursday, speaking at an event in Washington, D.C. hosted by Nextgov and Defense One." [9]

[8] https://fcw.com/articles/2018/12/12/dod-deasy-ai-williams.aspx
[9] https://www.nextgov.com/it-modernization/2019/03/without-jedi-pentagons-artificial-intelligence-efforts-may-be-hindered/155934/

Strategic Focus Areas

Primary Focus Areas [10]

- Delivering AI-enabled capabilities that address key missions
- Partnering with leading private sector technology companies, academia, and global allies and partners
- Cultivating a leading AI workforce
- Leading in military ethics and AI safety

[10] https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF, pages 11-16

Strategic Focus Areas

- Delivering AI-enabled capabilities that address key missions
  - Improve situational awareness and decision-making
  - Increase safety of operating equipment
  - Implement predictive maintenance and supply
  - Streamline business processes

"The Defense Innovation Unit (DIU) and the U.S. Air Force are working together and with the JAIC to produce prototypes of Predictive Maintenance solutions and to scale successes. These commercially developed AI-based applications have the potential to predict more accurately maintenance needs on equipment, such as the E-3 Sentry, F-16 Fighting Falcon, F-35 Lightning II, and Bradley Fighting Vehicle, thereby improving availability and reducing costs." [11]

[11] https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF, pages 11-16

Strategic Focus Areas

- Partnering with leading private sector technology companies, academia, and global allies and partners
  - Form open mission initiatives focused on global challenges
  - Strengthen academic partnerships and seeding new AI innovations
  - Enhance partnerships with US industry
  - Evolve international alliances and partnerships
  - Engage with the open source community

"The Defense Innovation Unit (DIU) is a fast-moving government entity that accelerates the adoption of commercial technology into the U.S. military to strengthen national security. DIU works with companies to prototype commercial solutions against DoD problems. Contracts are typically awarded in less than 90 days. Since it was established in 2016, DIU has awarded nearly 100 prototype contracts across a variety of areas, including several AI projects. Of these, several were transferred to the Military Departments and Services to increase capability, reduce costs, and improve efficiency." [12]

[12] https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF, pages 11-16

Strategic Focus Areas

- Cultivating a leading AI workforce
  - Offer individuals the chance to make an impact
  - Provide comprehensive AI training and cultivating workforce talent
  - Bring critical AI skills into service
  - Build a culture that embraces experimentation

"DoD recognizes the need to educate our workforce to navigate the AI era. We are leveraging the rise of digital content, including MOOCs (massive open online courses), e-books, and online videos, to provide employees with curated learning experiences, and augmenting this with classroom instruction from AI experts in industry and at top U.S. universities." [13]

[13] https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF, pages 11-16

Strategic Focus Areas

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- Leading in military ethics and AI safety
  - Develop AI principles for defense
  - Invest in R&D for resilient, robust, reliable, and secure AI
  - Fund research to understand and explain AI-driven decisions and actions
  - Promote transparency in AI research
  - Advocate for a global set of military AI guidelines
  - Use AI to reduce the risk of civilian casualties and other collateral damage

"DARPA is now funding research into AI that can explain its decision-making rationale to humans, which is critical for enabling humans to understand, appropriately trust, and effectively manage AI systems. This research is one component of a multi-year campaign called AI Next, which provides research investments aimed at transforming computers from specialized tools to partners in problem-solving." [14]

[14] https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF, pages 11-16

Conclusion

"The present moment is pivotal: we must act to protect our security and advance our competiveness, seizing the initiative to lead the world in the development and adoption of transformative defense AI solutions that are safe, ethical, and secure." [15]

[15] https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF page 17

References

- DoD AI Strategy Press Release
  - https://dod.defense.gov/News/News-Releases/News-Release-View/Article/1755388/new-strategy-outlines-path-forward-for-artificial-intelligence/
- DoD AI Strategy Document
  - https://media.defense.gov/2019/Feb/12/2002088963/-1/-1/1/SUMMARY-OF-DOD-AI-STRATEGY.PDF
- DoD Open Source Software Memorandum
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14. ABSTRACT
Other nations are making significant investments in Artificial Intelligence (AI) for military purposes. In order for the U.S. to maintain its strategic position and prevail on future battlefields, it is critical that the DoD fully harness the potential of AI to empower the warfighter. This presentation will provide an overview of the 2018 DoD Artificial Intelligence Strategy that was released in February 2019, and will cover the following topics: (a) Strategic Objectives, (b) Strategic Approach, and (c) Strategic Focus Areas.

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